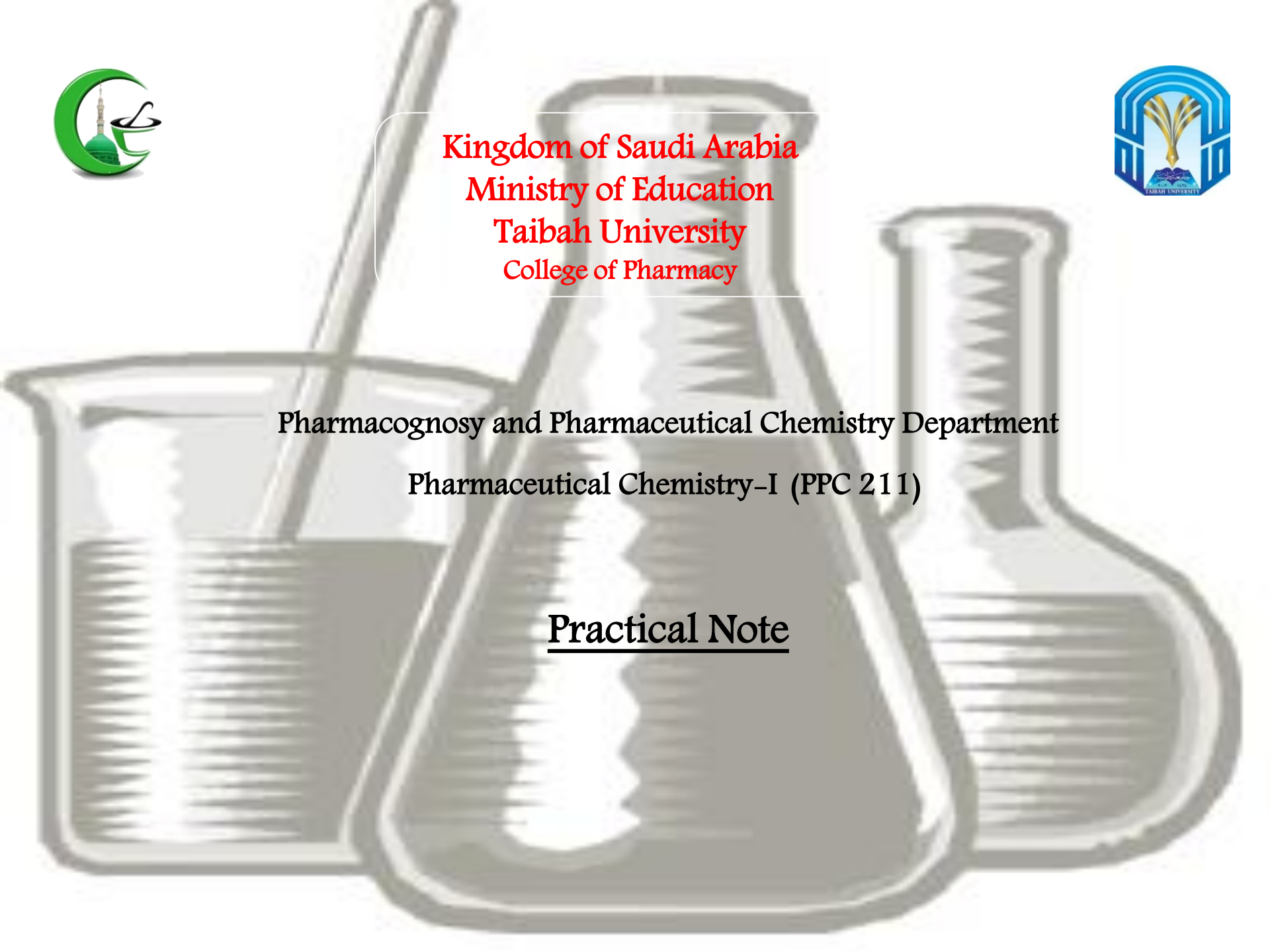


Kingdom of Saudi Arabia
Ministry of Education
Taibah University
College of Pharmacy

Pharmacognosy and Pharmaceutical Chemistry Department

Pharmaceutical Chemistry-I (PPC 211)

Practical Note

LAB .1

Safety in Chemistry Laboratories

1. You will not perform special experiments or any procedure, except the one assigned to you.

2. When you are not sure about the label on a bottle or which chemical to use, ask the instructor. You will not guess and you will not ask another student.

3. If you drop any glass and it breaks on the lab bench or floor, you will brush or sweep it up and put it in a wastebasket.

4. When heating anything in a test tube, you will point the tube along the length of the bench and will be sure not to point it at any person.

5. When diluting acid, you will pour the acid into the water.

6. When aware of any acid, or alkali, on the skin, you will immediately wash thoroughly with water.

7. When splashed with large quantities of acid or alkali, you will immediately use the emergency shower.

8. If your hair is longer than shoulder length, you will tie it back before you work in the laboratory.

LAB .1

Safety in Chemistry Laboratories

9. You will never taste a chemical in the laboratory unless given specific instructions to do so.

10. When smelling a substance, you will use your hand to wave the vapors toward your face.

11. When irritating gases are produced by the experiment you are working on, you will move the whole experiment into the hood and turn on the fan.

12. You will wear goggles or another form of eye protection at all times when anyone is working with chemicals in the laboratory.

13. If you do not wear goggles and are splashed in the eye, you will have someone immediately wash your eye with running water. You will have to continue to wash out your eye for twenty minutes. You will do the same thing for anyone else you may see get a chemical splashed in his or her eye.

LAB .1

Safety in Chemistry Laboratories

14. If you wear contact lenses and are splashed in the eye, you will have someone wash the eye immediately. You will try to remove the contacts only several minutes after the washing has begun. You should continue to wash the eye for twenty minutes

15. If you feel ill, you will report this to the instructor before you leave the laboratory.

16. You will wash your hands before leaving the laboratory for any reason at all.

17. You will use the fire extinguisher to put out any chemical, paper, or electrical fires, which occur in the laboratory.

18. If a person's clothing catches on fire, you will tightly wrap the person in a fire blanket to smother the flames.

19. You will turn off your burner as soon as you have finished using it, each time, before you go on the next step in your experiment.

LAB .1

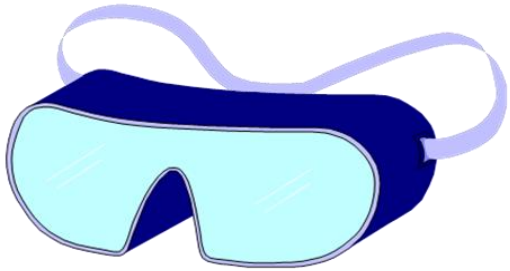
Safety in Chemistry Laboratories

What happen if you are not follow the safety rules?

Safely works in the laboratory

الحماية الشخصية

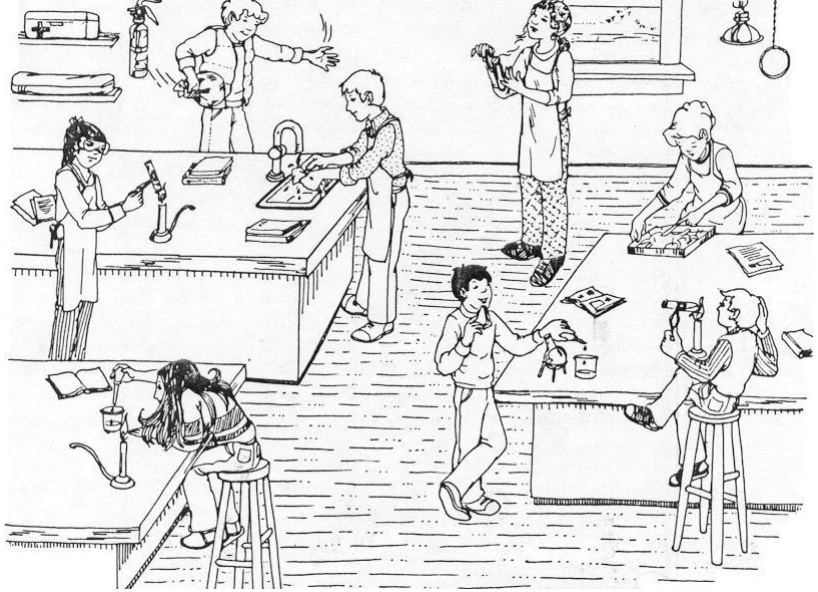
النظارات الواقية للعينين



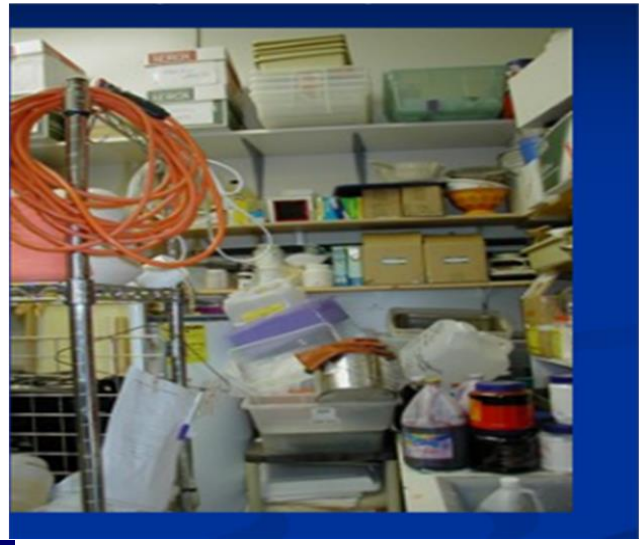
لبس الأشمغة و الغُتر في المختبر أثناء العمل المخبري ممنوع تماما

القفازات الواقية

اللاتكس و النيوبرين و المطاط البيوتيلي



الترتيب العام



Science Lab Safety Features

Fire Extinguisher Chart

Extinguisher		Type of Fire				
Colour	Type	Solids (wood, paper, cloth, etc)	Flammable Liquids	Flammable Gasses	Electrical Equipment	Cooking Oils & Fats
	Water	✓ Yes	✗ No	✗ No	✗ No	✗ No
	Foam	✓ Yes	✓ Yes	✗ No	✗ No	✓ Yes
	Dry Powder	✓ Yes	✓ Yes	✓ Yes	✓ Yes	✗ No
	Carbon Dioxide (CO_2)	✗ No	✓ Yes	✗ No	✓ Yes	✓ Yes

Fire Blanket

إرشادات إجبارية

إرشادات الاستدلال والمعلومات

إرشادات خطورة المواد الكيميائية

Laboratory equipment and techniques

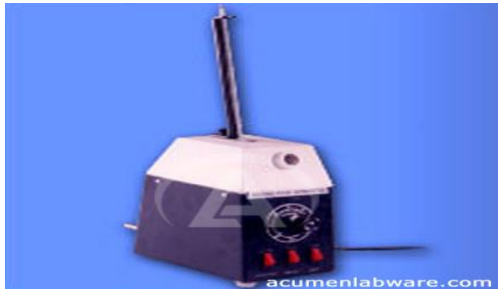
1- Glass Wares:

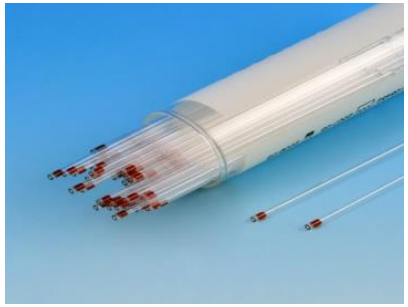
Reflux Condenser:

Heating Sources:

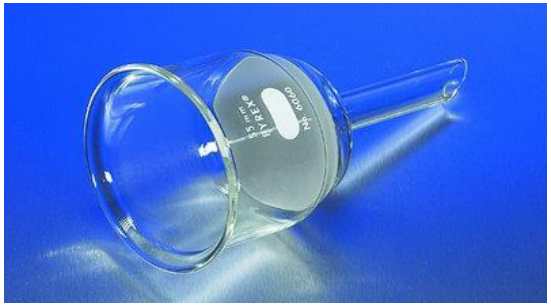
Handling and weighing chemicals:

melting point:





filtration:



IDENTIFICATION OF FUNCTIONAL GROUPS

Basis for identification

1- Physical properties:

A) Condition

B) Odor

C) color

D) Solubility tests:

I- Water solubility with litmus paper

II- Water insoluble tested in 10% NaOH strong acids soluble while weak insoluble

III- Insoluble tested in dil HCL

IV- Insoluble tested in conc H_2SO_4Determine the acid-base characters.

2- Chemical properties

I- Dry heat:

A- Change in appearance:

sublim., evap., solid. Or melting

B- Degree of inflammability:

inflammable with or without smoky flame or non inflammable

C- Odor of the flame:

fishy, bitter, almond, burnt sugar, vinegar, sweet or odorless

II- Action of soda lime

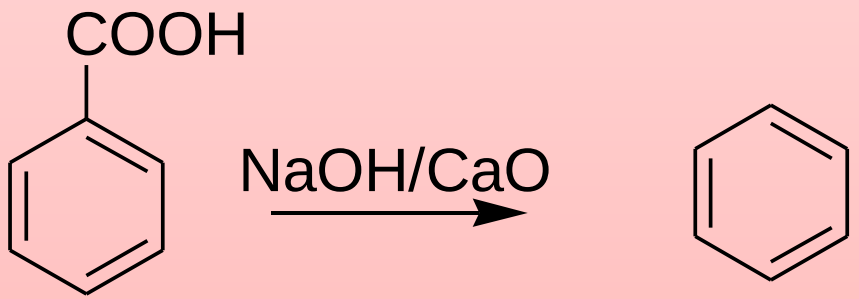
It is applied for solid samples only

It is a fused mixture of NaOH and Cao

A- Hydrolyzing agent:

$CH_3COONH_4 + NaOH = CH_3COONa + NH_4OH$

B- Decarboxylation:



C- Dehydrating agent

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

VI- Action of Na_2CO_3

3- Special test

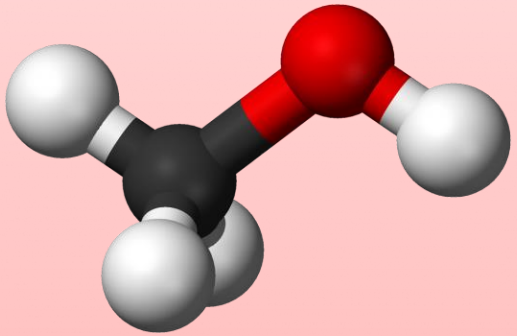
Alcohols (R-OH)

1-Methanol CH_3OH:

I-Physical characters

II-Miscibility test

III- General reactions:



1-Action of 30% NaOH

2- Action of Neutral $FeCl_3$

3- Action of conc H_2SO_4

4- Action of Na_2CO_3

Special test (Esterification reaction):

$ROH + R_1COOH = R_1COOR + H_2O$ (in presence of H_2SO_4)

1)0.05 ml of Methanol + 0.5 ml salicylic a and 2 ml H_2SO_4

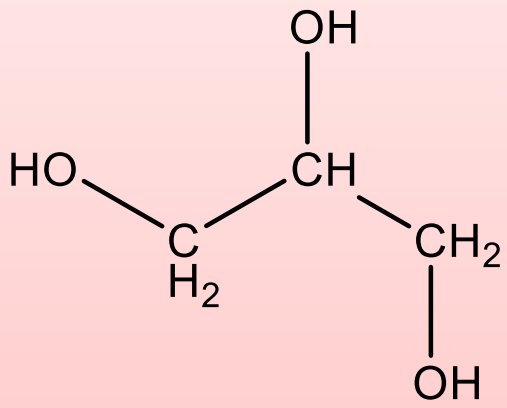
2)Heat gently for 2 minutes

3)Pour into sod carbonate solution

4)Ester will be separated as oily droplets of winter green odor of methyl salicylate

Alcohols (R-OH)

1- Glycerol $C_3H_8O_3$:



I-Physical characters

II-Miscibility test

III- General reactions

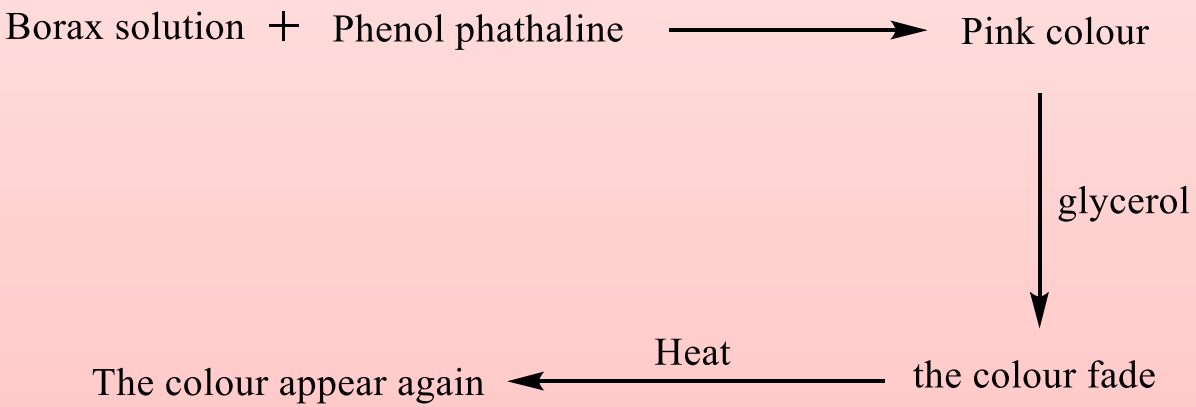
1-Action of 30% NaOH

2- Action of Neutral $FeCl_3$

3- Action of conc H_2SO_4

4- Action of Na_2CO_3

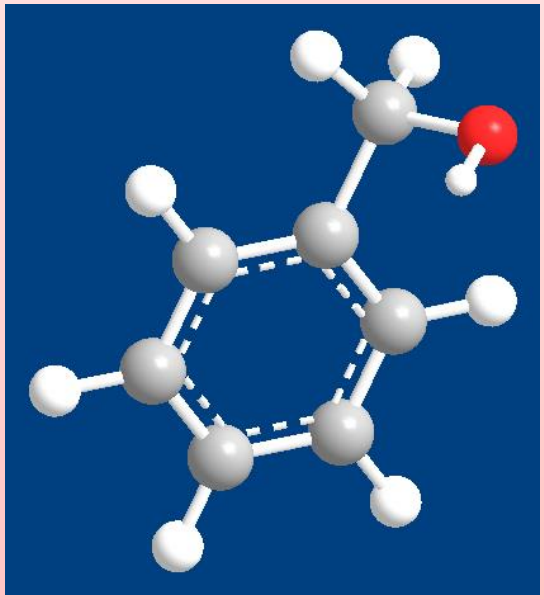
Borax test:



1)0.5 ml of borax solution + 2 drops of Ph.Ph pink colour produce.

2)Add 0.5 glycerol the pink colour disappear 3)Heat the mixture the pink colour appear

3-Benzyl alcohol(C_7H_7OH)



I-Physical characters

II-Miscibility test

III- General reactions

1-Action of 30% NaOH

2- Action of Neutral $FeCl_3$

3- Action of conc H_2SO_4

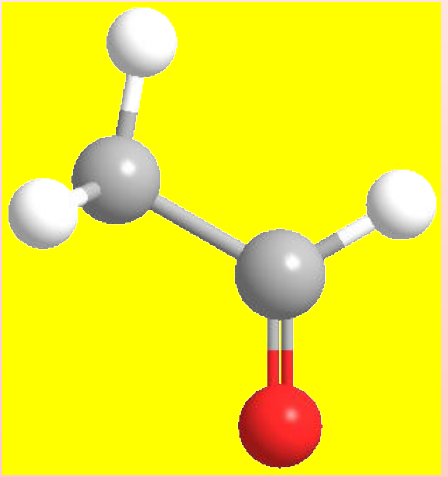
4- Action of Na_2CO_3

Special test (CONC. H2SO4):

1ml of benzyl alcohol + 3drops of sulphoric acid

❖ Notice the dirty white precipitate (PPt).

Aldehyde (R-COH)



1-Formaldehyde (HCHO):

I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

VI- Action of Na_2CO_3

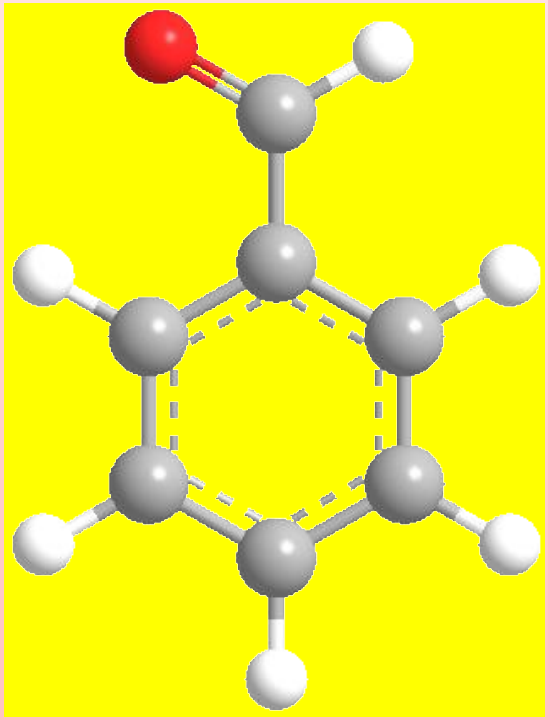
Special chemical test

1-Crimson red test:

1)1ml of formaldehyde+ 0.5 gm salicylic acid of+ H2SO4

Crimson red color is developed

2-Benzaldehyde(C_7H_6O):



I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

VI- Action of Na_2CO_3

Special chemical test

Schiff's test

Fehling solnt:

Special test:

A) Schiff's test

1ml of benzaldehyde+1drop of Schiff reagent

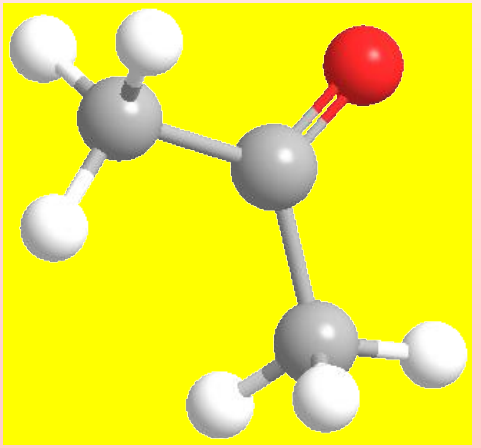
Magenta red color

B) Fehling solnt:

1ml of benzaldehyde+1ml of fehling A and B + 1 ml of Na2CO3.

The blue colour turn to red after standing.

Ketone (R-COR)



Acetone (C_3H_6O):

I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

VI- Action of Na_2CO_3

Special test:

Schiff's test:

Iodoform test:

Bisulfite reaction:

Special test:

A) Schiff's test

1ml of benzaldehyde+1drop of Schiff reagent

Magenta red color

B) Iodoform:

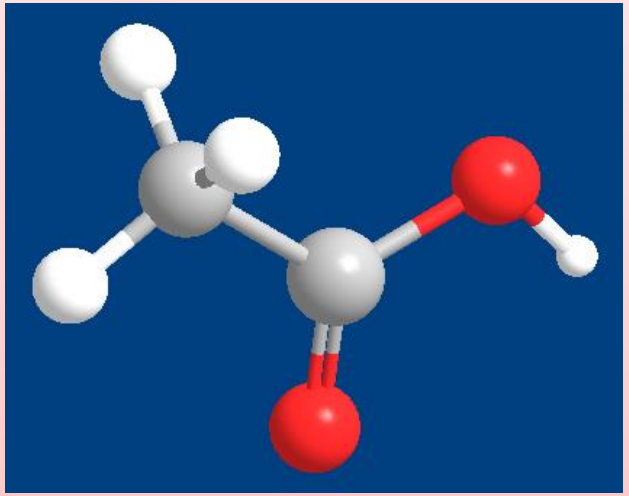
1ml of acetone+2ml of NaOH+drops of iodine until the yellow colour form.

C) Bisulfite reaction:

1ml of acetone+3ml of Conc. Sodium bisulfite and shake well white ppt. is form.

Acid (R-COOH)

1- Acetic acid (CH_3COOH):



I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

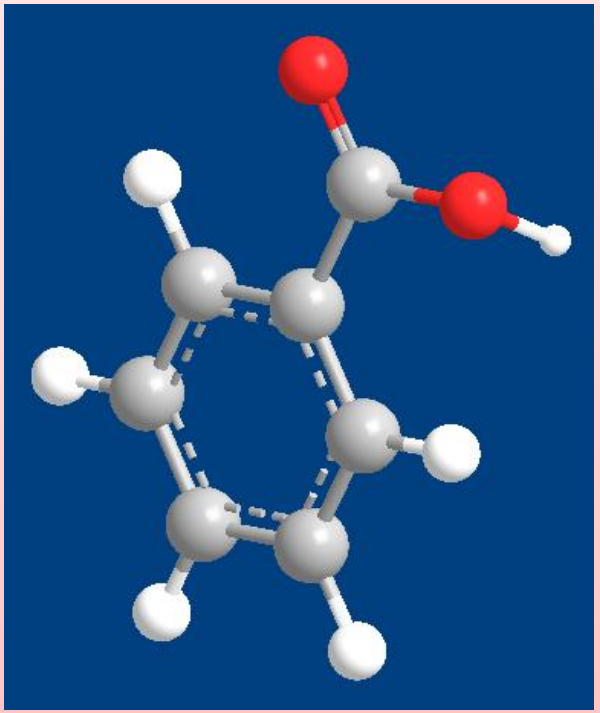
VI- Action of Na_2CO_3

Special reactions

Esterification reaction

$$CH_3COOH + C_2H_5OH \xrightarrow{H_2SO_4} CH_3COOC_2H_5 + H_2O$$

2- Salicylic acid (C_6H_5COOH):



I-Physical characters

II-Solubility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

VI- Action of Na_2CO_3

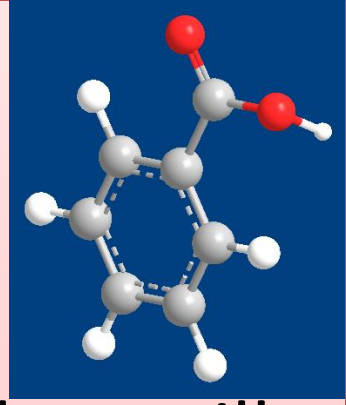
VII- Soda lime test: it gives phenol on hot.

Special test:

Esterification reaction

$FeCl_3$ test

2- Salicylic acid (C_6H_5COOH):



Special test:

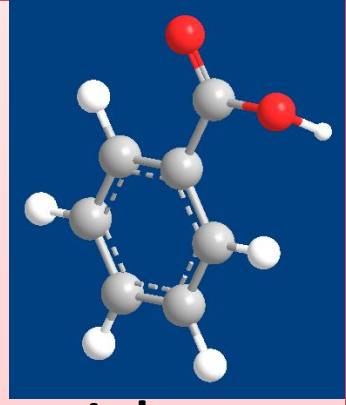
$FeCl_3$ test

- Few mg of salicylic acid add **$FeCl_3$** violet colour will form.

Esterfication test:

- 1) 2mg salicylic + 0.5 ml of Methanol + drops of H_2SO_4
- 2)Heat gently for 2 minutes
- 3)Pour into sod carbonate solution
- 4)Ester will be separated as oily droplets of winter green odor of methyl salicylate

2- Salicylic acid (C_6H_5COOH):

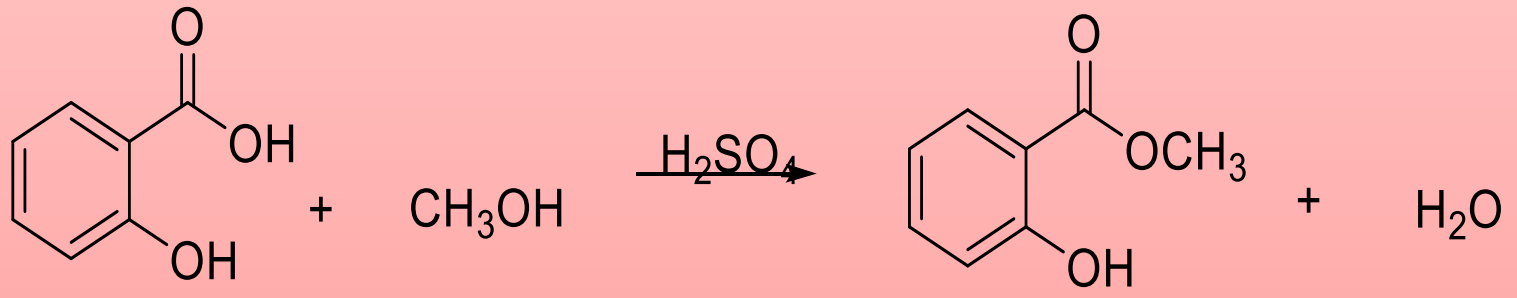


Special test:

Formalin test:

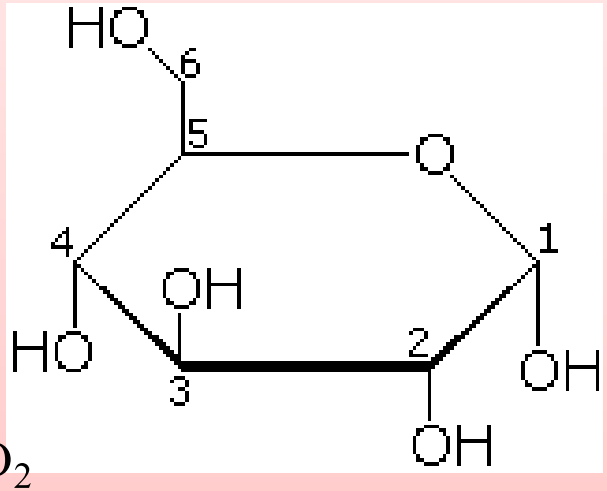
- 0.5 mg salicylic acid + 1ml of formaldehyde with drops of H2SO4
- Crimson red color is developed

Esterfication quation:



Carbohydrates

1- Glucose($C_6H_{12}O_6$):



I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4

$$\text{Charring with } CO_2 \uparrow + SO_2$$

VI- Action of Na_2CO_3

Special test:

Molish test:

Reduction test:

A) Amm AgNO3-----Silver mirror

B) Fehling test ------red ppt

C) Bendict test------+ve

Carbohydrates

Special test:

Molish test:

To solution of 0.05mg of carbohydrates +2ml of water then add 1 drop of alpha naphthol with few drops of H2SO4.

- A deep violet coloration is produced

Reduction test:

A) **Amm AgNO3-----Silver mirror**

B) **Fehling test ------red ppt**

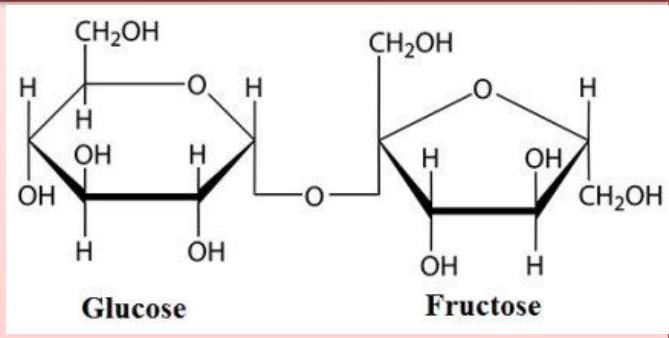
1)2ml of glucose+ 2ml of fehling solutuion

2) Put the mixture on water bath

3) The reduction takes place and red ppt will formed.

Carbohydrates

2- Sucrose($C_{12}H_{22}O_{11}$):



I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4 → Charring with CO_2 ↑ + SO_2

VI- Action of Na_2CO_3

Special test:

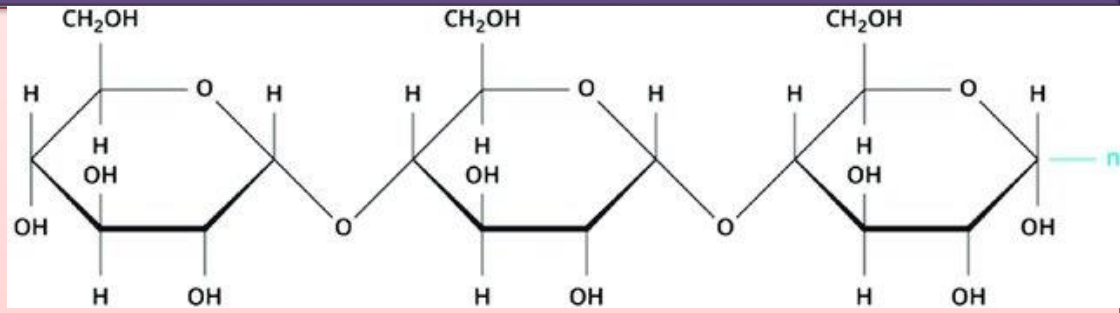
Cobalt nitrate:

To aqueous solution of sucrose add few drops of cobalt nitrate and excess of NaOH

Apermenant violert colour is produced.

Carbohydrates

3- Starch$(C_6H_{10}O_5)_n$:



I-Physical characters

II-Miscibility test

III- Action of 30% NaOH

IV- Action of Neutral $FeCl_3$

V- Action of conc H_2SO_4 Charring with CO_2 ↑ + SO_2

VI- Action of Na_2CO_3

Special test:

Iodine test:

Add 2 drops of dil iodine to about 1ml of starch solution.

A deep blue colour is produce which disappear on boiling and reappear on cooling.